



Posters Chapter

Pinus nigra

Pinus nigra

P3-07 Total and soluble organic carbon and active organic matter along the soil profile of a chronosequence of three Stone pine forests on Mount Vesuvius

Maria GIORDANO¹, Anna DE MARCO¹, Armando ZARRELLI², Vincenzo PERINO²
and Annalia VIRZO DE SANTO¹

¹Univ. degli Studi di Napoli, Federico II, Biologia Funzionale e Strutturale, Napoli, Italy,
maria.giordano@unina.it, ademarco@unina.it

²Univ. degli Studi di Napoli, Federico II, Chimica organica e biochimica, Napoli, Italy

Significant amounts of organic matter are stored in the deep soil layers. However, most studies dealing with organic matter amount, composition and turnover in forest soils concentrate on the organic layers and the upper mineral soil. In contrast the knowledge concerning the quantity and the stability of C pool in the deeper soil layers are quite limited.

The aim of this study was to assess, along the whole soil profile (organic and mineral layers), the amount of organic carbon as well as its soluble and active (microbial) fractions in three Stone pine forests. Within the National Park Vesuvius, a chronosequence was selected encompassing three stands, respectively 39 (BF), 69 (PG) and 99 years (CM) old. The chronosequence allowed estimating the changes with forest age in soil organic C and soluble C, and the below-ground distribution of the two C-pools. Measurements of microbial biomass and activity along the soil profile were performed to evaluate the active organic matter. Soluble C was analyzed for chemical structure by ¹H CPMAS NMR spectra.

The oldest forest (CM), compared to BF and PG, had higher organic matter, C and N contents in the organic layers (litter and humus) and in the 0-5 cm mineral layer. PG forest, compared to CM and BF, showed the highest values of organic matter, N and C/N ratio in the deeper mineral soil. Soluble carbon was detected at all depths.

The fraction soluble C / total C was low in the upper mineral soil and high in the deep mineral soil. The most abundant components of soluble C were alkyls and alcohols at all depths and at all stands. Aromatic components appeared in the deepest layers. Microbial biomass, microbial respiration and the amount of fungal mycelium were highest in the organic layers.

When considering the active organic C as a fraction of total organic C:

- 1) the lowest values of fungal mycelium and microbial respiration occurred in the organic layers;
- 2) the youngest forest stand showed the highest amount of fungal mycelium in the mineral soil whilst the oldest forest stand had the lowest microbial biomass and respiration.

The results indicate that organic matter turnover was more active in the upper mineral soil layers and decreased with depth and forest age leading to a major accumulation in the deepest layers of the oldest forest stand.

Keywords: *Pinus pinea*, microbial biomass and respiration, C pools